Fishy Facts

Objective
Students will identify the basic internal and external parts of a fish and how those parts help a fish live.

Curricular Areas
Science and Language Arts

California Content Standards
GRADES 3-8

Science

3rd Life 3 a, b, c, d; Investigations 5 e
4th Life 3 a, b, c, d, e; Investigations 6 c
5th Life 2 a, b, c, d, e; Investigations 6 h, i
6th Ecology 5 c, e; Resources 6 b, Investigations 7 c, d, e
7th Living Systems 5 a, b, c, d, g; Investigations 7 b, c, e
8th Life Science 6 a, b, c; 8 c, d

English Language Arts

3rd Reading 2.2, 0.3, 0.4, 0.5, 6.1; Writing 1.1, 0.3, 0.4, 2.2; Written/Oral 1.1, 0.2, 0.3, 0.4; Speaking 1.1, 0.5, 0.6, 0.4, 0.8, 2.1, 0.4
4th Writing 1.1, 0.2, 0.3, 0.5, 0.7, 0.8, 0.10; 2.1, 2.3; Written/Oral 1.0; Listen/Speak 1.0; Speaking 2.0
5th Reading 1.0, 2.0; Writing 2.0; Written/ Oral 1.0; Listen/Speak 1.0, 2.0
6th Reading 1.0, 2.0; Writing 2.0; Written/Oral 1.0; Listen/Speak 1.0, 2.0
7th Reading 2.0; Writing 1.0, 2.0; Listen/Speak 1.0, 2.0
8th Writing 1.0, 2.0; Speaking 1.0, 2.0

Method
Students research and use interview techniques in order to develop natural history information about fish.

Materials
- Time to complete: (1 or 2) 50-minute periods.
- writing materials
- *Fishy Facts Review*

Background
Although there are about as many kinds (species) of fish as mammals, birds, reptiles and amphibians put together, the habitat and behavior of fish make them difficult to observe in nature. Fish are aquatic animals adapted to life under water. Fish come in many sizes and colors. There are tiny fish, giant fish, flat fish, skinny fish, flying fish, electric fish, and fish that live in schools. Because of the variety of conditions within each habitat, many different fish can live together and flourish. Fish can be found wherever there is water; salt water (like the ocean) and freshwater (like lakes, streams and rivers). The body, gills, eyes, nostrils and fins of fish allow them to live under water and survive in their habitats. Fish have streamlined body shapes which help them move through water and swim against the current.

Procedure
1. Discuss the job of a reporter; most students will identify with TV news reporters. Talk about techniques of interviewing and various styles of writing.
2. Students will play the role of a newspaper reporter and interview a fish (modeled by another student) to discover how a fish can live life in water.
3. Ask students what questions they would ask a fish. Make a list of these questions. Questions might be: Do fish breathe? Do fish sleep? Do fish think?
4. Divide the class in teams of two students. Each team will be given *Fishy Facts Review*. The teams will decide which student will be the reporter. The reporter will write a list of questions to ask and conduct the interview. The other student will assume the role of the fish and respond to the interviewer's questions. If the students wish, they may switch roles at mid-point of the interview.
5. The reporters record the information gathered from the *Fishy Facts Review* and from the interview.
6. Each team writes a newspaper article about the fish they interviewed.
7. Lead the class in a discussion of similarities and differences of fish, other wildlife, and humans.
8. Read the articles in class. Some of these articles may be used for the Unit 5 activity "River Valley Journal."

Extension
1. Have students do a fish print. (see "Fishy Facts for Early Childhood Education" extension)
2. Dissect a fish for observation.

Evaluation
- Name parts of a fish and how each helps the fish survive.

"Fish Facts Review" adapted with permission from *Some Things Fishy, A Teacher's Guide for the Feather River Fish Hatchery,* published by the CA Department of Water Resources, Office of Education.

Fishy Facts Review

Here are some general fish facts that you can learn and share with others.

Body Parts

All fish are cold-blooded vertebrates. Cold blooded means they have a body temperature that is close to that of the water in which they live. Vertebrate means they have a spinal column. Flexible backbones allow the wavelike swimming motion. The entire skeleton supports the body, and the brain case holds the brain (the skull has 40 to 60 bones).

Fish use their fins to control the direction of their movement. Unlike land animals, which only need to control their movement in a single plane, fish have the additional requirement of moving in three dimensions. The tail fin powers forward movement, helps brake, and controls direction, while the other fins control direction, help brake, steer and stabilize. Some slow-moving fish use their fins as oars.

To swim, fish use their muscles to wave their bodies from side to side. Fish swim in a manner that is not unlike the way a snake moves. A wave of muscle contractions moves along the body, starting with the head and ending with a snap of the tail. This undulating movement pushes sideways and backwards against the water, propelling the fish forward. There are variations among species, but one can estimate that the top speed of a fish is about seven miles per hour per foot of body length.

Overlapping scales protect a fish. Under a microscope scales show growth rings, which, like the growth rings of a tree trunk, can be used to estimate age. Fish don't grow more scales as they get older; the scales just get bigger. The scales, which are formed in the skin and overlap like shingles on a roof, protect against abrasion, disease, and predators. Some fish have large scales, some have small scales, and some have none at all. Slow-moving fish have large scales, while the more active cruisers have smaller scales.

Slime (mucus), which is produced by a fish's skin, protects against disease, fungus, and parasites. If you want to catch and then release a fish, you should wet your hands before touching it to keep from removing this sticky protective covering.

You can tell what kind of food a fish eats by looking at its mouth and teeth. The mouth structure and teeth of all animals give clues to the food that they eat. For example, salmon and steelhead have backward-pointing, needle-like teeth. These teeth form a one-way path for lively, slippery food that is swallowed whole. Salmon and steelhead also have teeth on their tongues and the roof of their mouths.

Senses

Fish have hearing organs that allow them to hear very well. Their ears are located under their skin on either side of the head. Sound travels five times faster in water than in air.

Fish are able to sense nearby objects and movement with their lateral line. The lateral line is a fluid-filled tube that runs along both sides of the fish. Vibrations enter the tube through tiny pores and activate sensory nerves. Changes in pressure and the patterns of vibrations warn the fish of nearby animals and objects. This is the sense that allows the precise coordination of schools of fish.

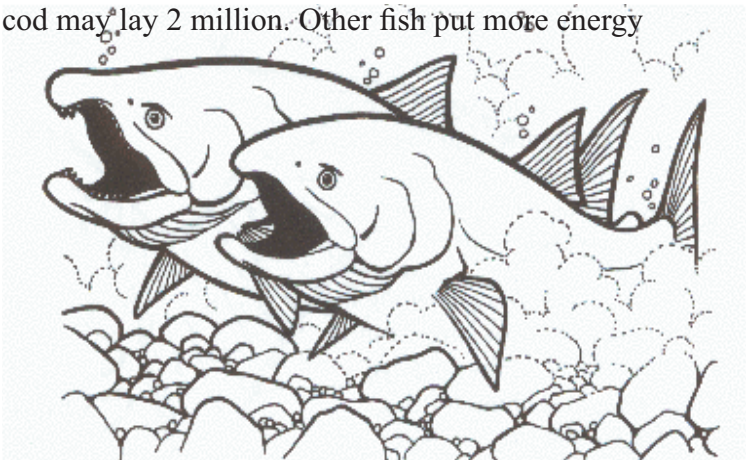
Most fish have good eyesight. Fish have excellent near-distance eyesight. Underwater, visibility is limited and far-distance vision is of no use. Some fish living in dark conditions (e.g., cave fish) are born blind. Since fish have no eyelids, water keeps the surface of the eyes moist. Fish near the surface can also see objects above the water. A fish's field of vision above the water is cone-shaped.

Fish use their nostrils for smelling but not for breathing. Most fish have two small openings located in front of their eyes. Water flows in one and out the other, passing over the sensory tissue. Smell can warn of danger, help find and identify food, and lead the fish back to their home stream. Some fish have a highly acute sense of smell.

Fish have taste buds inside their mouth and/or on the outside of their body. Fish can sense sweet, sour, salty, and bitter smells (as do humans). They may spit out food or a fishing lure if it does not taste correct. The importance of tasting depends on the lifestyle of the fish.

Reproduction

Most fish reproduce (have young) by laying eggs. Some fish lay many tiny eggs of which only a few survive; a striped bass can lay 200,000 eggs while a cod may lay 2 million. Other fish put more energy



into larger and more protected eggs. A larger percent, but not a larger number, of these eggs survive. The number of eggs a female produces is somewhat dependent on her size (the larger the fish, the more eggs). Chinook salmon and steelhead lay about 5,000 eggs. Salmon can have between 3,000 and 12,000 eggs.

Additional Information

Biologists specializing in the study of fish are called Ichthyologists. These experts have a knowledge of the physical traits and the behavior of fish species.

Fish do have brains, although not as large or complex as humans. Many fishes can demonstrate a memory of colors and shapes. Some predatory fish seem to "plan" attacks by hiding, waiting, and then ambushing prey.

What is the plural of "fish?" If you have one guppy, you have a "fish." If you have two guppies, you have two "fish." If you have one guppy and one goldfish, you have two "fishes." "Fish" can be singular or plural as long as you mean only one kind of fish. "Fishes" is the plural when you are referring to two or more different kinds of fish.

How many different kinds of fishes are there is not exactly known. People have discovered or described or named over 21,000 different species (kinds) of fishes. There may be undiscovered species in places like the South American rain forest, the Arctic or deep in the ocean.

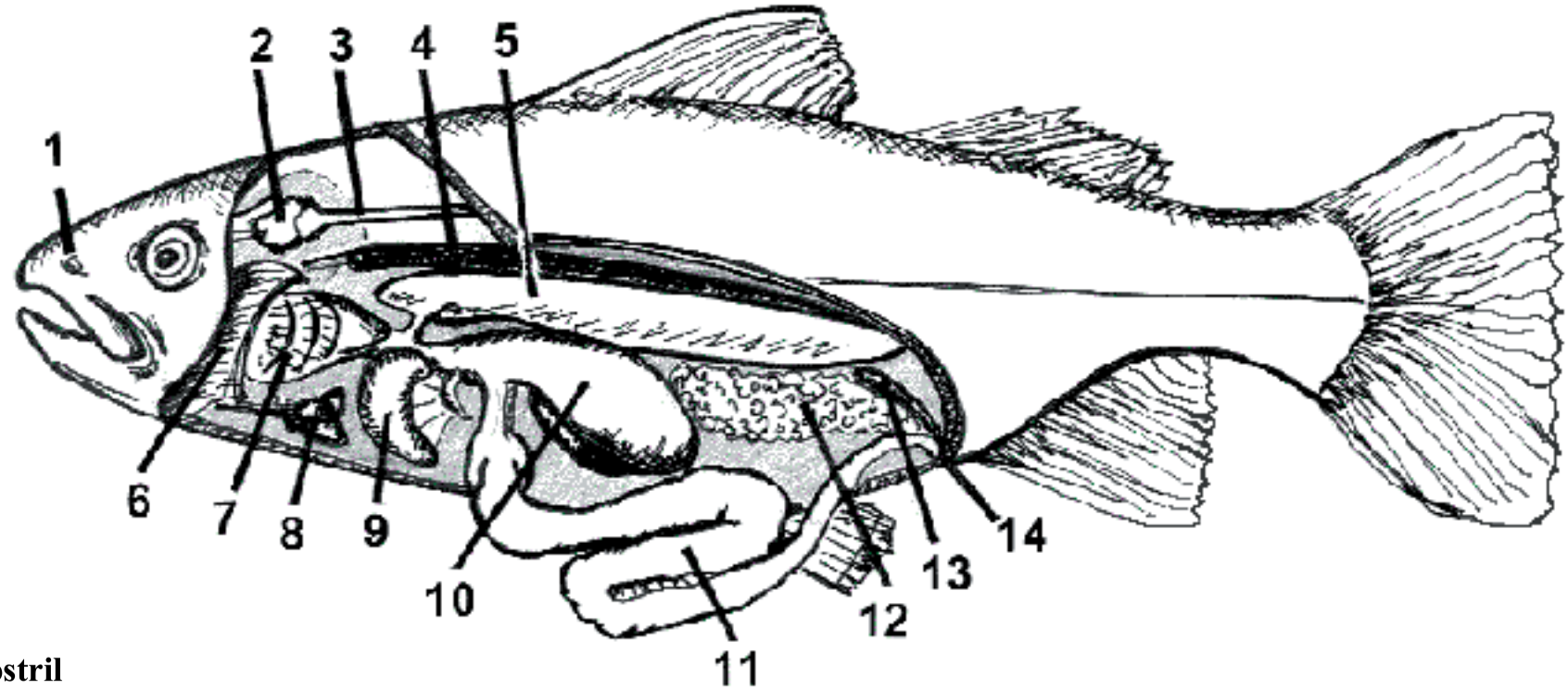
How long can fish live out of water depends on the kind of fish. The African lungfish is adapted to survive drought periods and can live as long as six ot seven years out of water. Many fish will die after as few as 15 seconds out of water.

Organs

A fish's heart is located between the gills, much like the human heart is located between the lungs. Blood is pumped from the heart to the gills where waste gases are given off and oxygen is absorbed from the water. From the gills, the blood flows through the rest of the body and returns to the heart.

The kidney helps control the amount of water in a fish's body. The two kidneys are located between the backbone and the swim bladder. In freshwater fish excrete great quantities of diluted urine; in salt water they excrete small amounts of concentrated urine. Few fish are able to live in both fresh and salt water.

Fish breathe by using their gills to take oxygen out of the water. In equal volumes of water and air, the water contains about 96 % less oxygen. Gills are efficient at removing available oxygen due to their great surface area. Fish are highly vulnerable to water pol-



1. nostril
2. brain
3. spinal cord
4. kidney
5. swim bladder
6. operculum
7. gills
8. heart
9. liver
10. stomach
11. intestine
12. gonads
13. urinary bladder
14. cloaca or vent

Fishy Facts Revealed

Fish Adapted to Life in the Water

Fish vary greatly in size and color. There are tiny fish, giant fish, flat fish, skinny fish, flying fish, electric fish, and fish that live in schools. Fish represent more than half of all vertebrate animals. All fish are adapted to life under water. Their streamline body is good for moving through the water. Fish can be found wherever there's water; salt water (like the ocean) and fresh water (like lakes, streams and rivers).

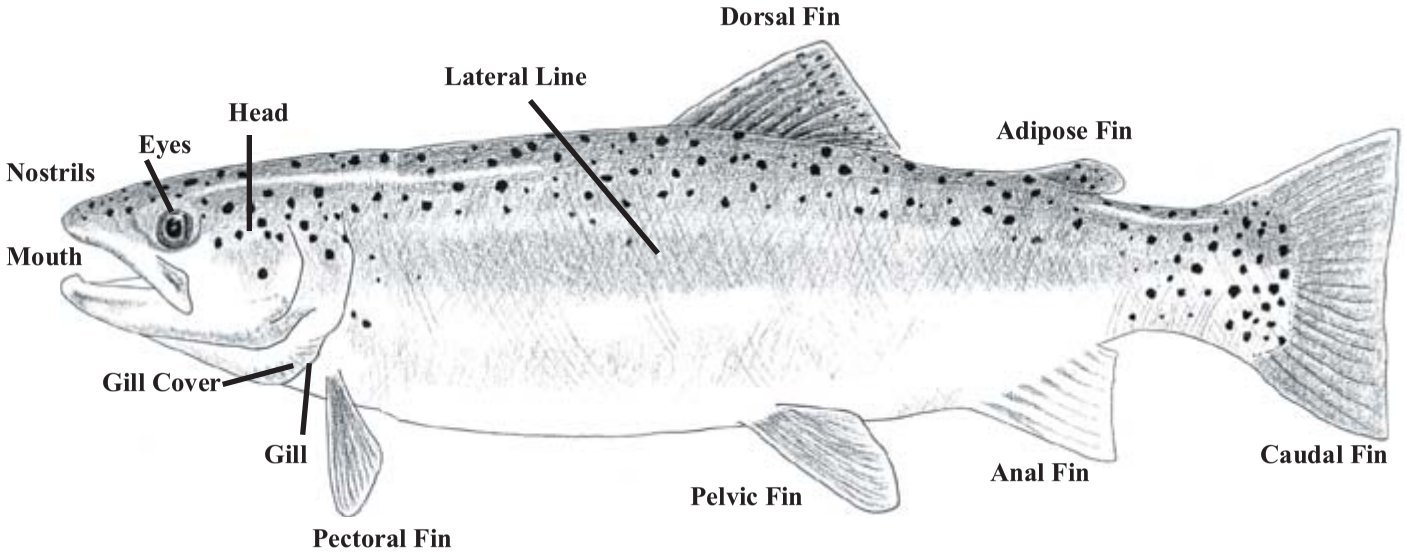
Gills – Las Agallas

Fish, like people, need to breathe oxygen in order to live. People get oxygen from the air they breathe. Fish get oxygen from the water which flows through their mouths and passes by their gills.

Gills are found under a flap just behind the head. They have many folds and pieces of skin which take oxygen from the water.

Eyes – Los Ojos

Fish have eyes that work independently. They can see in all directions. They can see in front and back at the same time.



Fins – Las Aletas

Fins help the fish swim. The dorsal and anal fins help keep the fish balanced so its body won't turn from side to side. Pectoral and pelvic fins are like arms and legs in animals. These fins are used for turning, backing up and stopping, in addition to balancing. The caudal or tail fin sweeps from side to side and moves the fish forward. The adipose fin is small and fleshy.

Lateral Line – La Linea

Most fish have a line running along each side of their body. The little holes in the line help the fish sense movements of other animals and objects in the water.

Nostrils – Las Narices

Fish use their nostrils for smelling but not for breathing. A sense of smell is used to find food. Some fish (like salmon) use smell for finding their way back to their home

Fishy Facts for Early Childhood Education

Objective
Students will identify the basic parts of a fish and how those parts help a fish live.

Curricular Areas
Science (fish and the parts of a fish); Math (puzzle making and geometric figures); Social Science (group work and class presentations); Art (creating a fish); Language Arts (reading names for the parts of a fish)

California Content Standards
Science
K Life 2, Earth 3, Investigations 4
1st Life 2, Investigations 4
2nd Life 2, Investigations 4
Math
K Measure & Geometry 2.0, Reasoning 1.0
1st Measure & Geometry 2.0, Reasoning 1.0
Social Science
K 1, 3
1st 1, 4
2nd 1, 4
Language Arts
K Written/Oral 1.0, Listening 1.0, 2.0
1st Reading 1.0, Writing 1.0, Written/Oral 1.0, Listening 1.0, 2.0
2nd Written/Oral 1.0, Listening 1.0, 2.0

Method
Students work in groups to create a fish using cards of various fish parts. They will color the fish in its habitat. Cards will have fish parts written in both English and Spanish.

Materials
- Coloring utensils
- Copies of the fish puzzle, one per student (use cardstock or heavy gauged paper)
- Paper
- Glue

NOTE: If possible bring in a model of a fish

Background
Fish are aquatic animals that have special adaptations in order to be able to live in the water. Their body, gills, eyes, nostrils and fins allow them to live underwater and survive in their habitats. These adaptations allow the fish to be better suited to the habitat in which it lives. Because of the variety of conditions within each habitat, many different fish can live together and flourish.

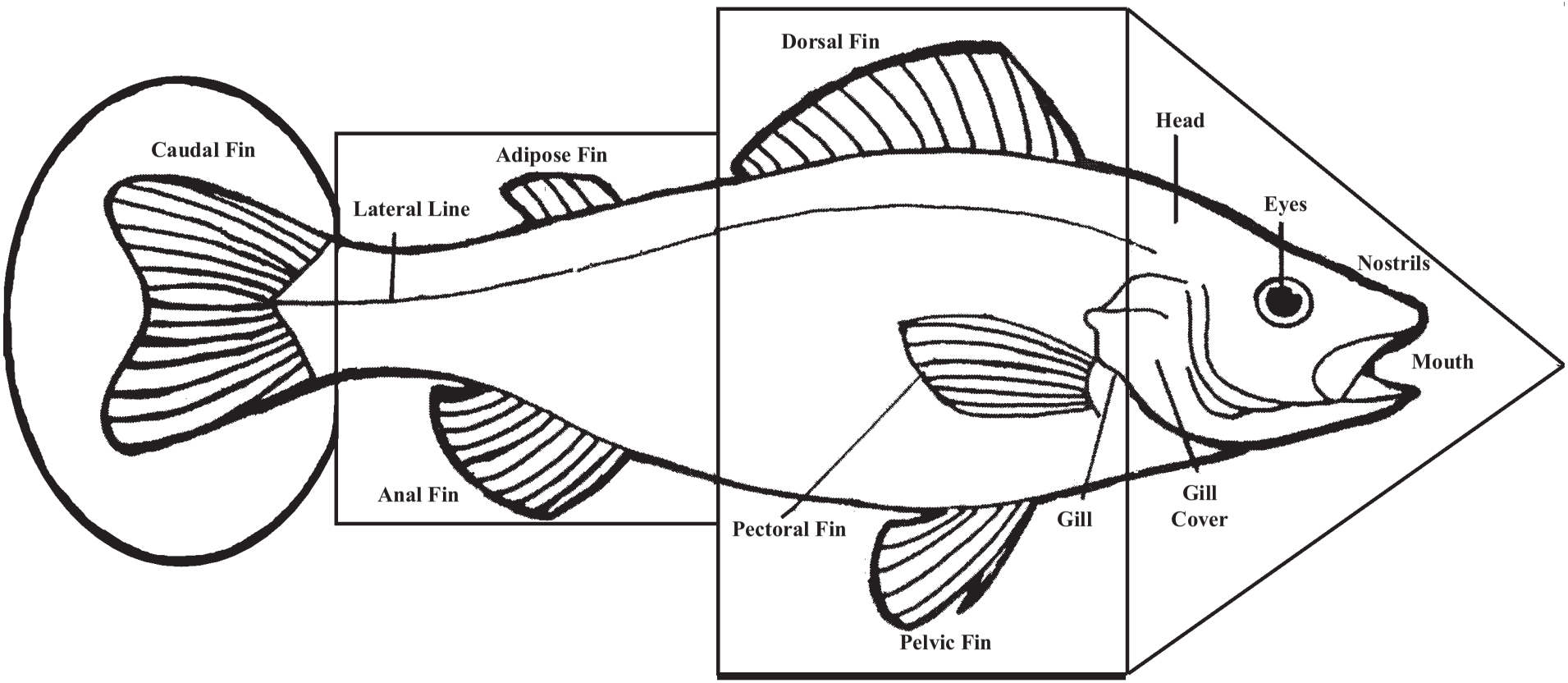
Procedure
1. Ask students how many have ever seen a real fish. What do students like about fish? Why is a fish different from other animals?
2. Read *Swimmy*, *The Rainbow Fish* or *El Pez Arco Iris* to the students; or show them many pictures of different fish. Ask students: How do fish breathe? What do fish eat? How do they swim? Where do fish live?
3. Divide class into 3 to 4 groups. Show students the cards and model how to create a fish and glue it together. Explain that it is a puzzle which they will color after the pieces are in place.
4. Pass out cards and discuss the body parts and the function of each part.
5. Students create their fish, glue it to a sheet of paper and color the fish and its habitat (home).
6. Have students share their projects and explain the various parts of their fish.

Extensions
1. Observe actual fish. Have students discuss what they see–the body parts and elements of the habitat.
2. Have students do a fish print. Use a rubber fish replica available from classroom suppliers. This activity allows students to experience a Japanese cultural artistic expression called Gyotaku, the art of Japanese fish printing. The activity is similar to the way Japanese fishermen recorded their day's catch. The art of gyataku (gyo=fish, taku=rubbing) originated in Japan during the early 1800s and was first practiced by fishermen to preserve a record of their catch. A gyotaku is made when watercolors are painted on the actual fish and then rice paper or fabric is applied and gently rubbed. The result: a mirror image, rich in detail and color.
3. Dissect a fish for observation.

Evaluation

Activity reprinted with permission from the *CA Project WILD Aquatic Early Childhood Education Supplement*. For more information contact the CA Project Wild office (888) 945-3334 or email bwinn@dfg.ca.gov.

Fish Puzzle!



Extension

For centers, color several puzzles to represent flashy tropical fish. Cut them and have students mix and match to create their own new species. Have students decide the habitat, food, name, etc. for their fish. Older students can write a mini report on their new fish. Use these reports to create a class fish book.